Synopsis for PhD Programme

1)Title of the Research

Studies on the Formation and Evolution of Atherosclerosis Through Mathematical Models

2)Name of the candidate

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4) Registration No. and Date:

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Research Proposal:

Arteriosclerosis is known to be an arterial disease arising from the hardening of human arteries owing to the deposition of phospholipids, cholesterol, fatty substances and proliferation of connective tissues. Atherosclerosis is a specific type of arteriosclerosis, which occurs due to plaque deposition. This is a chronic disease and its growth rate is rapidly increasing. It is believed that by 2020, it will be a leading cause of deaths in all over the World. During 1970's, atherosclerosis was believed to be caused by deposition of lipids on arterial walls. Subsequently, a theory of response to injury was proposed that the occurrence of atherosclerosis is grossly responsible to the injury of endothelium. Keeping the gravity of the problem in mind, many theoretical investigations have been carried out with the use of mathematical models in order to indicate the importance of the cellular constituents responsible for these diseases. So, it is needless to mention that Mathematical modeling of atherosclerosis can provide a deeper insight into such complex phenomena and predict their evolution at large. Our proposed study on the formation and evolution of such arterial constriction based on appropriate mathematical models will certainly be of some use in clinical implications and the impact of relevant cellular components on atherosclerosis can be estimated. To carry out this theoretical investigation, we often need to apply the theory of dynamical systems, bifurcation analysis and advanced numerical method wherever necessary.

Key words: Mathematical Modelling, Dynamical System, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equations, MATLAB

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